UNITED STATES PATENT AND TRADEMARK OFFICE

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EXAMINER
GOLUB, MARCIA A

ART UNIT	PAPER NUMBER
2828	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>04 May 2009</u>.
2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.
    4a) Of the above claim(s) <u>8-20</u> is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-7</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

U.S. Patent and Trademark Office
PTOL-326 (Rev. 7-05)   Office Action Summary   Part of Paper No./Mail Date 20090505

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claim 1 filed on 05/04/09 have been considered but they are not persuasive.

Regarding applicant's argument that '304 does not disclose that the optical laser gain material 26 is constructed such that a constant ratio between a diameter of the laser beam 64 and the size of the optical laser gain material 26 is maintained. The examiner points out that '304 discloses a laser gain material that is elliptical in shape and has a uniform shape (the dimensions of major axis "b" and minor axis "a" do not change). Fig 12 of '304 also discloses a laser beam 64 of uniform diameter c, the invention of '304 would not work if the diameter was not uniform. Since neither the gain medium nor the laser beam change their dimensions the ratio between them will always be constant ($a/c=C_1$, $b/c=C_2$).

Regarding applicant's argument that '185 does not disclose that "the size of the oval-shaped rod have a relationship given by $b=a \cos \theta$, wherein the value of incidence angle θ provides a relationship given by $b>a$". The examiner points to col. 2 ln. 68-73 of '185 that discloses that for a circular beam the dimensions of the gain medium cross section (elliptical in shape) should satisfy a relationship given by width/length=cosine of angle of refraction. In an ellipse b is always greater than a; also, the light beam is incident on the surface at Brewster's angle. Therefore, $b/a = \cos \theta$ and the claim limitation is satisfied.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1- 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vetrovec (7,085,304) hereinafter '304, and further in view of Young (3,611,185)

hereinafter '185.

     Fig 12 of '304 discloses a solid-state-laser pumping module comprising:

1.   "a pumping medium member [26] including a plate-shaped [elliptical] solid state laser medium that provides a gain generated by absorption of pumping light to laser light to amplify the laser light,

     a reflecting member [308] disposed on a surface of said solid state laser medium which is opposite to a laser light incidence surface of said solid state laser medium, for reflecting the laser light which is incident upon said solid state laser medium via said light incidence surface and which propagates through said solid state laser medium,

     and a cooling member [307,303] for removing heat which is transferred thereto, via said reflecting member, from said solid state laser medium,

     the laser light incidence surface of said solid state laser medium having a size of a [minor axis] in a direction perpendicular to a plane defined by both an optical axis of said laser light and a normal to the laser light incidence surface of said solid state laser medium, and a size of b [major axis] in a longitudinal direction perpendicular to said direction and said normal, where θ is an incidence angle [Brewster's angle] at which said laser light is incident upon the laser light incidence surface(6/43-46), and b>a [in an ellipse the major axis b is always larger than the minor axis a], and wherein said laser light beam is shaped having a diameter c [Fig 12 shows a laser beam 64 with a uniform diameter] and the solid state laser medium is constructed such that a constant ratio between the beam diameter c of the laser light and the size of the solid state laser medium in both directions is maintained." Since the laser beam has a uniform diameter and the dimensions of the elliptical gain medium do not change, the ratios a/c and b/c will always be constant.

     '304 discloses that the size of the gain medium can vary widely and should be chosen to provide a good mode fill for the incident light, in particular if the light is incident at 0 degrees the shape of the gain medium should be circular, and if the light is incident at a Brewster's angle the shape should be elliptical.

     '304 does not disclose:

     "the sizes having a relationship given by b=a/cos θ, wherein the value of

incidence angle θ provides a relationship given by b>a"

However, '185 discloses that for a circular beam the dimensions of the gain medium cross section should satisfy a relationship given by width/length=cosine of angle of refraction of light at the incidence surface. (2/68-73)

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '185 into the device of '304 by making the elliptical gain medium that satisfies a relationship b=a/cos θ, where θ is the incidence angle, for at least the purpose of increasing the amplification of the incident laser light by providing a good mode fill.

'304 further discloses:

2.   "characterized in that the laser light is linearly polarized light which is polarized in either the direction perpendicular to the plane defined by both the optical axis of said laser light and the normal to the laser light incidence surface of said solid state laser medium, or a direction in said plane." (6/40-50)

3.   "characterized in that the incidence angle θ of the laser light is 45 degrees or more." The value of the Brewster's angle for a YAG laser is approximately 60 degrees.

4.   "characterized in that the incidence angle θ of the laser light is a Brewster angle peculiar to the solid state laser medium." (6/40-50)

5.   "characterized in comprising a slab waveguide member [28] having an incidence end surface [34] via which the pumping light generated by a pumping light source is incident thereupon, and an emergence end surface [30] having a smaller area than the incidence end surface, said emergence end surface being bonded to a pumping light incidence surface of the solid state laser medium, for introducing the pumping light from said pumping light source into said solid state laser medium via said pumping light incidence surface."

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brauch et al. (5,553,088) hereinafter '088 and further in view of '185.

Figs 2 and 16 of '088 disclose a solid-state-laser pumping module comprising:

1.   "a pumping medium member [12] including a plate-shaped [circular] solid state

laser medium that provides a gain generated by absorption of pumping light to laser light to amplify the laser light,

a reflecting member [16] disposed on a surface of said solid state laser medium which is opposite to a laser light incidence surface of said solid state laser medium, for reflecting the laser light which is incident upon said solid state laser medium via said light incidence surface and which propagates through said solid state laser medium,

and a cooling member [18] for removing heat which is transferred thereto, via said reflecting member, from said solid state laser medium,

the laser light incidence surface of said solid state laser medium having a size of a [minor axis] in a direction perpendicular to a plane defined by both an optical axis of said laser light and a normal to the laser light incidence surface of said solid state laser medium, and a size of b [major axis] in a longitudinal direction perpendicular to said direction and said normal, where θ is an incidence angle [α/2] at which said laser light is incident upon the laser light incidence surface, and wherein said laser light beam is shaped having a diameter c [Fig 16 shows a laser beam 24 with a uniform diameter] and the solid state laser medium is constructed such that a constant ratio between the beam diameter c of the laser light and the size of the solid state laser medium in both directions is maintained." Since the laser beam has a uniform diameter and the dimensions of the circular gain medium do not change, the ratios a/c and b/c will always be constant.

'088 does not disclose:

"the sizes having a relationship given by b=a/cos θ, wherein the value of incidence angle θ provides a relationship given by b>a"

However, '185 discloses that for a circular beam the dimensions of the gain medium cross section should satisfy a relationship given by width/length=cosine of angle of refraction of light at the incidence surface. (2/68-73)

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '185 into the device of '088 by making the elliptical gain medium that satisfies a relationship b=a/cos θ, where θ is the incidence

angle, for at least the purpose of increasing the amplification of the incident laser light
by providing a good mode fill.

'088 further discloses:

6.   "characterized in that the reflecting member [16] and the cooling member [18] are
bonded to each other using a bonding agent [46, 48] having a higher degree of softness
than the solid state laser medium, for bonding the reflecting member and the cooling
member to each other while covering projections and depressions which exist on their
bonding surfaces which are to be bonded to each other."

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over '088 as
applied to claim 1 above.

Figs 2 and 16 of '088 disclose a solid-state-laser pumping module as described
above, but does not disclose:

7.   "characterized in that the reflecting member and the cooling member are bonded
to each other using an optical bonding agent having a smaller refractive index than the
solid state laser medium."

However, 18/11-16 discloses using a material that matches the refractive index
of the gain medium to bond the laser medium to the waveguide. The material is
selected to be smaller than the refractive index of the laser gain medium but larger than
the refractive index of the waveguide.

It would have been obvious to one of ordinary skill in the art at the time of the
invention to incorporate the teachings of embodiment 10 into the device of embodiment
2 by using the optically matched material to bond the reflecting member and cooling
member for at least the purpose of confining the light to the laser gain medium.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time
policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE
MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Info

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARCIA A. GOLUB-MILLER whose telephone number is (571)272-8602. The examiner can normally be reached on M-Th 9:30-6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marcia A. Golub-Miller/
Examiner

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828